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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/088,975	08/13/2002	Thomas L Ritzdorf	SEMT118781	6706
26389	7590	05/18/2006		
CHRISTENSEN, O'CONNOR, JOHNSON, KINDNESS, PLLC 1420 FIFTH AVENUE SUITE 2800 SEATTLE, WA 98101-2347				
			EXAMINER LEADER, WILLIAM T	
			ART UNIT 1742	PAPER NUMBER

DATE MAILED: 05/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.



### **DETAILED ACTION**

1. Receipt of the papers filed on Marcy 3, 2006, is acknowledged. Claims 1, 3-8, 11-22, 24-26 and 28-32 are pending.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### ***Claim Rejections - 35 USC § 103***

3. Claims 1, 3-8, 11-15, 22, 24-26, 28-31 and 33-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubin et al (5,972,192) combined with Ueno (6,245,676), newly cited.

Dubin et al is interpreted and applied as in the previous office action. Applicant has amended independent claim 1 by adding the limitation that the second time period during which the electroplating power supplied between the anode and surface of the workpiece is greater than or equal than five seconds. The Ueno patent discloses the use of electroplating power which is periodically reversed. Waveforms are shown in figures 3 through 6. Time periods  $t_1$  and  $t_2$  which correspond to forward and reverse plating power are identified in figures 3 and 4. Ueno teaches that these time periods are chosen to be less than about 10 seconds. See column 10, lines 17-23. Ueno teaches that reversed electroplating power assists in removing any corner of an opening of a trench to prevent any pinch-off and to remove additive molecules that are adsorbed at a high current density portion. See column 9, lines 20-47. This time period overlaps the newly recited time period of greater than or equal to five seconds now recited by applicant.

Additionally, since Ueno shows multiple applications of the pulse pattern, cumulative times of greater than 10 seconds are suggested. It would have been obvious to have utilized time periods suggested by Ueno in the process of Dubin et al because the semiconductor would have been efficiently metallized as shown by Ueno.

4. With respect to newly presented claims 33-37, Ueno discloses the inclusion of off power between the pulses of forward and reverse plating power.

5. Claims 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubin et al (5,972,192) combined with Ueno (6,245,676) as applied to claims 1, 3-8, 11-15, 22, 24-26 and 28-37 above, and further in view of in view of Sonnenberg et al (5,223,118) and Creutz (3,770,598). Sonnenberg et al and Creutz are interpreted and applied as in the previous office action.

6. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dubin et al (5,972,192) combined with Ueno (6,245,676) as applied to claims 1, 3-8, 11-15, 22, 24-26 and 28-37 above, and further in view of in view of Ting et al (5,969,422). Ting is interpreted and applied as in the previous office action.

7. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dubin et al (5,972,192) combined with Ueno (6,245,676) as applied to claims 1, 3-8, 11-15, 22, 24-26 and 28-37 above, and further in view of Uzoh et al (6,251,251).

8. Claim 38 recites a diffuser plate between an anode and the location of the workpiece. The Uzoh et al patent is directed to apparatus for electroplating onto semiconductor wafers. As shown in figure 1 the apparatus includes diffuser plate 11 between anode 3 and the position of the workpiece. Uzoh et al teach that the diffuser plate redistributes the flow from a non-uniform pattern to a more uniform one or to that of some intended flow pattern (column 3, lines 6-9). It would have been obvious at the time the invention was made to have included a diffuser plate in the apparatus suggested by Dubin et al and Ueno because flow of the electrolyte would have been controlled.

9. Claims 1, 3-8, 11-15, 22, 24-26 and 28-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubin et al (5,972,192) for the reasons given in the previous office action and in view of the following comments.

10. Claims 16-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubin et al (5,972,192) and further in view of in view of Sonnenberg et al (5,223,118) and Creutz (3,770,598) for the reasons given in the previous office action and in view of the following comments.

11. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dubin et al (5,972,192) in view of in view of Ting et al (5,969,422) for the reasons given in the previous office action and in view of the following comments.

12. Claim 38 is rejected under 35 U.S.C. 103(a) as being unpatentable over Dubin et al (5,972,192) in view of Uzoh et al (6,251,251).

***Response to Arguments***

13. Applicant's Remarks have been carefully considered but are not deemed to be persuasive. Applicant has amended claim 1 to recite that the second time period is greater than or equal to five seconds. As indicated in the previous office action Dubin et al state that "In employing pulse electroplating in accordance with the present invention, one having ordinary skill in the art could easily optimize the relevant variables, such as the duty cycle, frequency and current density in a particular situation" (column 5, lines 63-67). In example 1 Dubin et al indicate that the kinetics of electroplating copper were observed after time periods of 20, 40 and 80 seconds. These time periods are all within the range now recited for the second time period now recited in claim 1. Time of electrolysis is a result-effective variable. The longer the time period, the greater the electrolytic effect achieved. Based on the teaching of Dubin et al, choice of an appropriate duration for the second time period would have been a matter of routine optimization within the skill of the ordinary worker in the art. Applicant has pointed to no results obtained by choosing a second time period of greater than or equal to five seconds.

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William T. Leader whose telephone number is 571-272-1245. The examiner can normally be reached on Mondays-Thursdays and alternate Fridays, 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King, can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1742

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



William Leader  
May 12, 2006

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